25X1X

1. The life of the Soviet bearing 2GLZ under test was compared with that of three similar American bearings which were tested as controls. The hours life to failure of the bearings was as follows:

Domestic Bearings

Soviet 2GLZ

No. 1 - 116.5 hours No. 2 - 116.5 406 hours

No. 3 - 24.75 No. 4 - 119.25

COUNTRY

**SUBJECT** 

PLACE ACQUIRED

DATE ACQUIRED

DATE OF

2. The physical properties of the Soviet bearing 2GLZ and of domestic control bearings Numbers 1 and 2 are reported as follows:

bearings Numbers 1 and 2 are reported as 10110WS8										
	No. 1	No. 2	'2GLZ							
Rockwell "C" hardness		· .								
Inner race Outer race Balls (Max. Avg. Min.) Retainer	63.3 63.1 66; 64.5;63 79.5	63.3 62 66;64.5;62 80	64 63.4 663.5361 79.5							
Rockwell MBM hardness Retainer	58	59	58							
Magnaflux examination	all parts OK	all parts OK	all parts OK							
Nitral etch examination	all parts OK	all parts OK	all parts OK							
Fracture grain size Inner race Outer race Balls	9.5 <del>/</del> 9 <del>/</del> 9 <b>-</b>	9.75 9 <i>∳</i> 9	6.25 9 8.5 – 9.5							
Non-metallic rating* Inner race Outer race 1 ball	not acceptable	just acceptable acceptable	de not acceptable e not acceptable e not acceptable							

CLASSIFICATION CONFIDENTIAL CUNTIFICATION

STATE X NAVY X NSRB DISTRIBUTION

ARMY X AIR X FB1

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- 2 -

- \*/Non-metallic rating based on micro-examination reported in Paragraph 3 below.
- 3. The heat treating of the 2GLZ bearing was unacceptable by USA standards, and the count of non-metallic inclusions (principally oxide and manganese sulphide stringers) was sub-standard for all parts of this bearing.

/Available from the CIA Library are photomicrographs of bearings 1 and 2 and bearing 2GLZ as follows: (a) Photomicrographs at 1000 diameters etched with Vilella's Reagent to show grain size; (b) Photomicrographs at 100 diameters, natural etched, to show structure; (c) Photomicrographs at 100 diameters unetched to show non-metallic inclusions.

4. The chemical analyses of bearings 1, 2 and 2GLZ are reported as follows:

	Bearing 1				Bearing 2		2GLZ				
Inner	Outer	Balls	Ret.	Inner	Outer	Balls	Ret.	Inner	Outer	Balls	Ret.
		1.06 .33		1.06 •35		•96 • <b>3</b> 7	.07 .39		1.01 .36		.11 .32
1.51 .10 .06 .02	1.46 .23 .12 .05	1.38 .21 .13 .03		1.47 .08 .06	1.43 .22 .09 .06	1.38 .25 .13		1.62 .18 .24	1.63 .22 .20 .03	.62 .11 .20	

Carbon
Manganese
Phosphorous
Sulphur
Silicon
Chromium
Nickel
Copper
Molybdenum

- 5. Conclusions drawn from these and former analyses of Soviet bearing 2GLZ are as follows:
  - a. Bearing 2GLZ outlasts comparable American bearings under identical test conditions by more than 3 to 1.
  - b. Soviet bearing 2GLZ shows evidence of dimensional control, heat treating, and non-metallic contamination which may be deliberately engineered to produce a product just good enough to do the intended job.
  - c. The chemical composition of bearing 2GLZ is conventional but somewhat high in copper.
  - d. Bearing 2GLZ shows unexpectedly small grain size in the inner race.

- end -

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S/SI/SULIUM TO UIA

Appendix

LIBRARY

X1000

Etched with Vilella's Reagent

Photo #5206

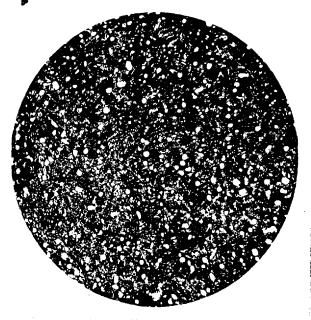


Figure 1 SKF #1 Inner

Photo #5203

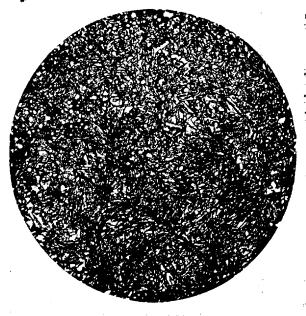
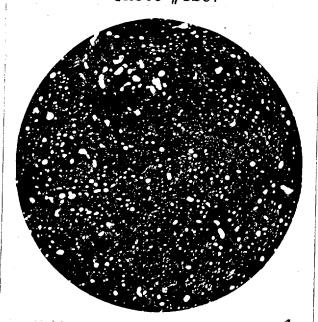


Figure 2 "X" Inner (FGS- $6\frac{1}{4}$ )

Photo #5207



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## Photo #5204



25X1A

3/21/51

Xloo

Nital Etch

Photo #5208

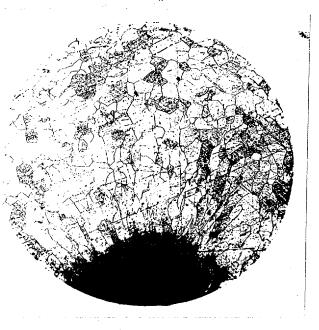


Figure 5 SKF #1 Retainer

Photo #5205

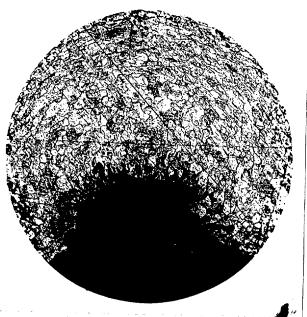


Figure 6

3/21/5RETURN TO GIA

Photo #5121 ISAN TO "X" Inner Ring

Photo #5119
"X" Outer Ring

Rating #4

Rating #3

Photo #5120
"X" Ball

Rating #3\frac{1}{2}
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....2\z7\2\

Non-Metallic Inclusion Rating 100X No Etch

Photo #5216 SKF #2 Outer Ring Photo #5117 SKF #2 Inner Ring

Rating #3

Rating #3

Photo #5118 SKF #2 Ball

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3/21/51

Photo #5122 SKF #1 Inner

Photo #5123 SKF #1 Ball

Rating #4

Rating #4

25X1A

## Comments

The SKF #2 bearing parts showed manganese sulphides, large oxide and small silicate-type inclusions. However, the outer and inner would be just acceptable according to our standards. The ball would be considered objectionable because of the small chaintype silicate inclusions.

The "X" bearing parts would be all rejected according to our standards. The type of inclusions are oxide and manganese sulphide stringers.

The SKF #1 bearing parts would also be rejected according to our standards.

The inclusions are mostly all of the long oxide stringer type.

25X1A

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